# Field survey of a rare endemic plant population: *Fritillaria pluriflora* (Adobe lily)

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## Background

California is widely known as a global biodiversity hotspot. An estimated 1,906 plant species out of 4,571 total species are endemics of CA (41.7% endemism) [3]. *Fritillaria pluriflora* Benth. (Fig. 1) is an endemic bulbiferous perennial with a limited distribution in CA. The herb's range is restricted to foothill savannas in the Northern Sacramento Valley and is highly edaphic (an affinity for mixed adobe clay serpentine substrates) [7].

Reproductive success is low and mortality rates are high among individuals, this coupled with habitat loss from grazing, mining, recreational use, and non-native invasion threatens remaining populations [1,7]. *Fritillaria pluriflora* is ranked as imperiled/vulnerable globally and state wide. However, it is not a listed species at the state and federal level, despite having a rare plant ranking of 1B.2 (fairly endangered) [1].

Rare plant population monitoring is crucial in identifying and address threats at any stage, and to warn of impending decline before rare endemic populations are extirpated [2].

## Objectives

- To survey the size of one known *F. pluriflora* population
  - Compare population size between plots
- Survey individuals by age class to determine recruitment of new plants
- Results to be used for 1) freely disseminating data to the botanical community for future population monitoring and 2) to submit rare plant observation data to the California Natural Diversity Database (CNDDB).

## Methods


**Figure 1.** *Fritillaria pluriflora,* individuals in the reproductive stage class are characterized by having four or more leaves during the growing season and producing flowers [1,7].

The survey site was selected based on the observed presence of *F. pluriflora* in spring 2014, 600 m north of State Hwy 20 on the border of Colusa and Lake Counties (Fig. 2). The site is described as a north/northeast aspect foothill oak savanna with 25-30% clay soils [5]. Five plots were selected within the savanna/meadow complex. Individuals were surveyed using random sampling (*n*= 40) within a polygon via *x*,*y* axes coordinates, in April 2016 (Fig. 3) [6]. A square quadrat (1 ft$^2$) was placed on the coordinates, all individuals were counted and classified as pre-reproductive (vegetative) or reproductive (flowered/ fruiting).

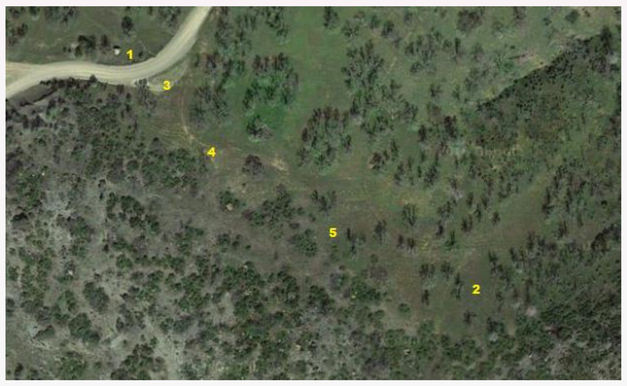


**Figure 2.** General location of plots surveyed based on GPS readings taken in the field.

Data were analyzed using One-Way ANOVA ($p< 0.05$) and Post-Hoc Tukey HSD for significance between frequency (*f*) of all individuals between plots, all reproductive individuals between plots, and all vegetative individuals between plots (Microsoft, Excel). Actual vs. expected individuals of all age classes were compared using Chi-Square analysis (Microsoft, Excel) .

**Figure 3.** Plotting out x and y axes for random quadrat sampling.

## Results

No significance was found for all parameters statistically analyzed ($p> 0.05$.). No difference in recruitment of new individuals among plots was detected. A total of 269 individuals were surveyed, 41.63% individuals were vegetative stage and 58.36% individuals were reproductive stage (Table 1).

**Table 1.** Total plot area (ft$^2$) and individuals counted by stage within plots (*n*= 269).

| Plot | Area (ft$^2$) | Veg. | Repro. | Total |
|---|---|---|---|---|
| 1 | 1,877.55 | 22 | 38 | 60 |
| 2 | 3,050.82 | 28 | 47 | 75 |
| 3 | 1,735.36 | 26 | 32 | 58 |
| 4 | 1,629.68 | 13 | 18 | 31 |
| 5 | 1,663.99 | 23 | 22 | 45 |
| TOT | 9,957.40 | 112 | 157 | 269 |

The most individuals in one quadrat count was 14, one in plot 2 and one in plot 5 (Fig. 4).

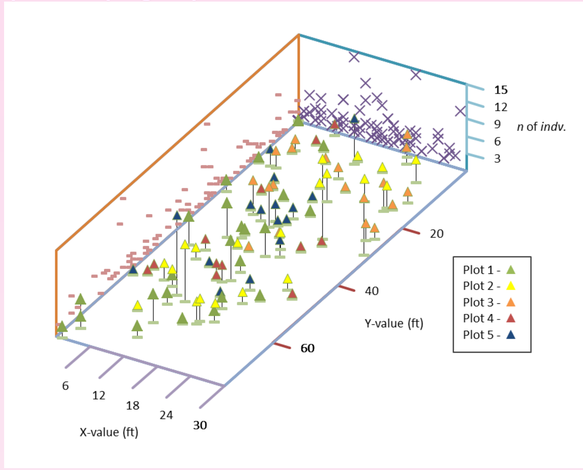


**Figure 4.** Distribution of individuals within plots.

## Discussion and Conclusion

To better determine future recruitment and stability of *F. pluriflora* populations, individuals all six age/stage classes should be surveyed. Some Adobe lily individuals exhibit dormancy and this must be considered when surveying populations [7].

This particular population may have rebounded from recent drought conditions, due to above average rainfall this last winter [4]. More long term monitoring is needed to determine the effects of drought on this population.

Most importantly, long term monitoring is recommended for this specific population, as recreational use is high in the area. Vehicle damage was observed in three surveyed plots. Management agencies should be notified about the vulnerability of the population so that the necessary conservation steps can be taken.

## References


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